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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/832,093	04/11/2001	Shigeo Ishikawa	Q64059	8684

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SUGHRUE, MION, ZINN, MACPEAK & SEAS
2100 Pennsylvania Avenue, N.W.
Washington, DC 20037

EXAMINER	
NGUYEN, KHIEM D	
ART UNIT	**PAPER NUMBER**
2823	

DATE MAILED: 02/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

CT

Office Action Summary	Application No.	Applicant(s)	
	09/832,093	ISHIKAWA, SHIGEO	
	Examiner	Art Unit	
	Khiem D. Nguyen	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 8-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 8-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 April 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5 and 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (U.S. Pub. 2002/0160113).

In re claim 1, **Li** discloses a method of forming an oxide film, comprising the steps of:

(a) starting a supply of a reaction gas at a first flow rate into a chamber **18** in which a plasma is formed (page 3, paragraph [0024]), such that an initial film is formed on a center region of a wafer **20** via a first nozzle **56** provided on the chamber above the center region of the substrate (page 3, paragraph [0027]) and

(b) starting a supply of the reaction gas at a second flow rate into the chamber in which the plasma is formed via second nozzle **34 and 34a** wherein the second nozzle are provided on side walls of the chamber above the wafer (page 3, paragraph [0025]), after the step (a), while the supply of the reaction gas at the first flow rate continues such that the oxide film is formed on the initial film (page 3, paragraph [0028], page 4, paragraphs [0035]-[0038] and **FIG. 3**).

Nozzles (**56** and **64**) positioned over the center of the substrate **20** inherently producing the film on the center region,

wherein the formation of the oxide film is initiated from the center region of the wafer in the above step (a), and the oxide film is formed on the whole of the wafer in step (b). Li discloses that the various components of chamber **2** are controlled by a processor. The processor operates under control of a computer program stored in a computer readable medium. The computer program dictates the various operating parameters, such as timing, mixture of gases, chamber pressure, substrate support temperature and RF power levels (page 3, paragraph [0026], Li et al.). As discloses on page 3, paragraph [0027] and FIG. 3 by Li et al., a center nozzle **56** is already located at a center region of the wafer **20** and thus by controlling operating parameters such as timing, mixture of gases, chamber pressure, substrate support temperature and RF power levels using the computer program will initially form an oxide at a center region of the wafer.

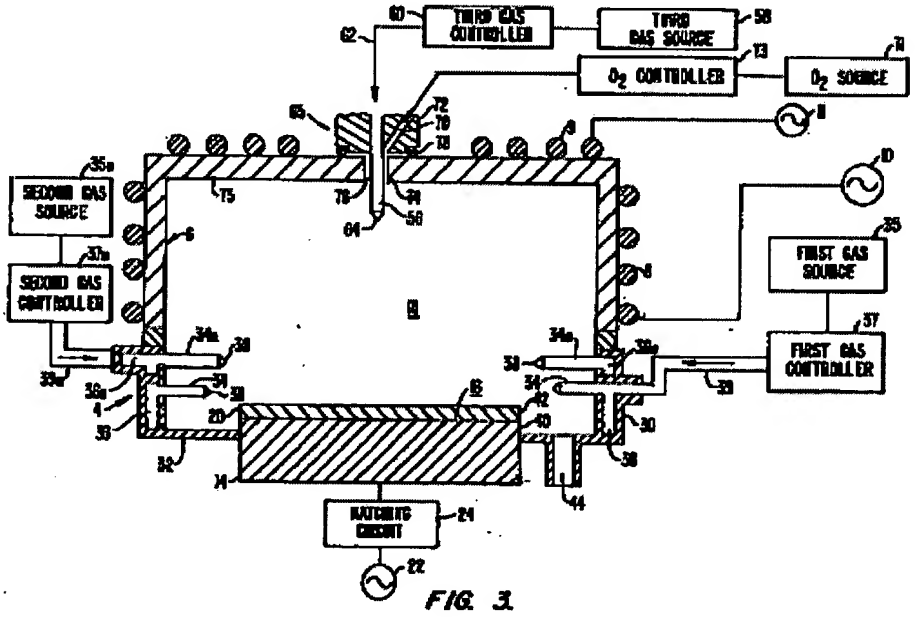

FIG. 3

Li has the same reaction gas flowing from nozzles **34 and 34a** and **56** using different flow rates (a mixture of gases from source **58)** and also allows the user to optimize different start times by using different controllers **37** and **60** for the reaction gases for desired results (page 4, paragraphs [0035]-[0038]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the Li reference to obtain an improved deposition chamber that incorporates an improved gas delivery system. The gas delivery system helps ensure that the proper ratio of process gases is uniformly delivered across a wafer's surface (page 2, paragraph [0011], Li).

In re claims 2 and 3, **Li** discloses the reaction gas is a compound gas containing Si and wherein the reaction gas is one of SiH_4 and SiF_4 (page 3, paragraph [0028]).

In re claims 4 and 5, **Li** does not explicitly disclose wherein the step (b) is carried out 1 to 10 seconds after the step (a) is carried out and wherein the first flow rate is in a range of one fifth to one tenth of the second flow rate.

Li, however, has the same reaction gas flowing from nozzles **34** and **34a** and **56** using different flow rates (a mixture of gases from source **58**) and also allows the user to optimize different start times by using different controllers **37** and **60** for the reaction gases for desired results (page 4, paragraphs [0035]-[0038]). **Li** also discloses the various components of chamber 2 are controlled by a process (not shown). The processor operates under control of a computer program stored in a computer-readable medium (also not shown). The computer program dictates the various operating parameters, such as timing, mixture of

gases, chamber pressure, substrate support temperature and RF power levels (page 3, paragraph [0026]).

Also, note that there is no evidence indicating the starting time and the flow rate ranges is critical and it has been held that it is not inventive to discover the optimum or workable range of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

In re claim 8, **Li** discloses a method of forming an oxide film, comprising the steps of:

(a) forming an initial film from a center region of a wafer by supplying a reaction gas at a first flow rate, via a first nozzle **56** wherein the first nozzle is provided on the chamber **18** above a center of the wafer **20** (page 3, paragraph [0027]) in which a plasma is formed (page 3, paragraph [0024]), such that an initial film is formed on a center region of a wafer **20**, while a thickness of the film is equal to or thinner than 10 nm and

(b) forming the oxide film on the wafer, by starting to supply the reaction gas at a second flow rate, via second nozzle **34 and 34a** wherein the second nozzle are provided on side walls of the chamber above the wafer (page 3,

paragraph [0025]), after the step (a), while continuing to supply the reaction gas at the first flow rate (page 3, paragraph [0028], page 4, paragraphs [0035]-[0038] and **FIG. 3**),

Nozzles **56** and **64** positioned over the center of the substrate **20** inherently producing the film on the center region.

wherein the formation of the oxide film is initiated from the center region of the wafer in the above step (a), and the oxide film is formed on the whole of the wafer in step (b). Li discloses that the various components of chamber **2** are controlled by a processor. The processor operates under control of a computer program stored in a computer readable medium. The computer program dictates the various operating parameters, such as timing, mixture of gases, chamber pressure, substrate support temperature and RF power levels (page 3, paragraph [0026], Li et al.). As discloses on page 3, paragraph [0027] and FIG. 3 by Li et al., a center nozzle **56** is already located at a center region of the wafer **20** and thus by controlling operating parameters such as timing, mixture of gases, chamber pressure, substrate support temperature and RF power levels using a computer program will initially form an oxide at a center region of the wafer.

Li has the same reaction gas flowing from nozzles **34 and 34a** and **56** using different flow rates (a mixture of gases from source **58)** and also allows the user to optimize different start times by using different controllers **37** and **60** for the reaction gases for desired results (page 4, paragraphs [0035]-[0038]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the Li reference to obtain an improved

deposition chamber that incorporates an improved gas delivery system. The gas delivery system helps ensure that the proper ratio of process gases is uniformly delivered across a wafer's surface (page 2, paragraph [0011], Li).

In re claims 9 and 12, **Li** does not explicitly disclose wherein the first flow rate is in a range of one fifth to one tenth of the second flow rate and wherein the step (b) is carried out 1 to 10 seconds after the step (a) is carried out.

Li, however, has the same reaction gas flowing from nozzles **34** and **34a** and **56** using different flow rates (a mixture of gases from source **58**) and also allows the user to optimize different start times by using different controllers **37** and **60** for the reaction gases for desired results (page 4, paragraphs [0035]-[0038]). **Li** also discloses the various components of chamber 2 are controlled by a process (not shown). The processor operates under control of a computer program stored in a computer-readable medium (also not shown). The computer program dictates the various operating parameters, such as timing, mixture of gases, chamber pressure, substrate support temperature and RF power levels (page 3, paragraph [0026]).

Also, note that there is no evidence indicating the starting time and the flow rate ranges is critical and it has been held that it is not inventive to discover the optimum or workable range of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable

recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

In re claims 10 and 11, **Li** discloses the reaction gas is a compound gas containing Si and wherein the reaction gas is one of SiH_4 and SiF_4 (page 3, paragraph [0028]).

Response to Applicant's Amendment and Arguments

Applicant's arguments filed December 1st, 2004 have been fully considered but they are not persuasive.

Applicant contends that Li et al. does not teach or suggest the presently claimed invention, specifically, Li et al does not teach, suggest or mention that an initial film is formed in the center of the region of the wafer, inter alia, as recited in independent claims 1 and 8.

In response to Applicant's contention that Li et al does not teach, suggest or mention that an initial film is formed in the center of the region of the wafer, inter alia, as recited in independent claims 1 and 8, Examiner respectfully disagrees. Li discloses that the various components of chamber 2 are controlled by a processor. The processor operates under control of a computer program stored in a computer readable medium. The computer program dictates the various operating parameters, such as timing, mixture of gases, chamber pressure, substrate support temperature and RF power levels (page 3, paragraph [0026]). As discloses on page 3, paragraph [0027] and FIG. 3, a center nozzle 56 is already located at a center region of the wafer 20 and thus by controlling operating

parameters such as timing, mixture of gases, chamber pressure, substrate support temperature and RF power levels using the computer program will initially form an oxide at a center region of the wafer.

For these reasons, examiner holds the rejection proper.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D. Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (571) 272-1855. The

fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

K.N.
February 16th, 2005

W. DAVID COLEMAN
PRIMARY EXAMINER